SCANNED, #8

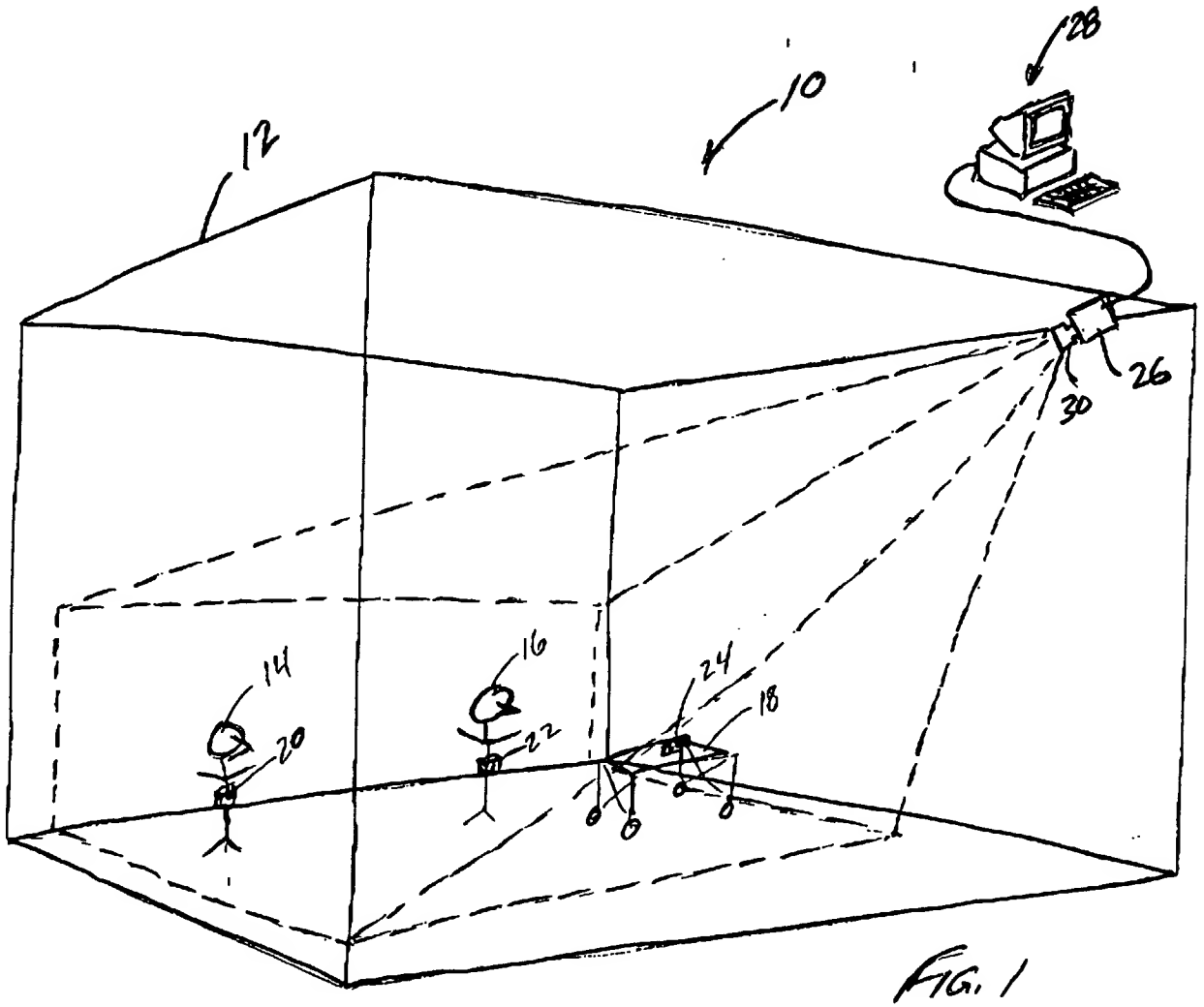

FIG. 1

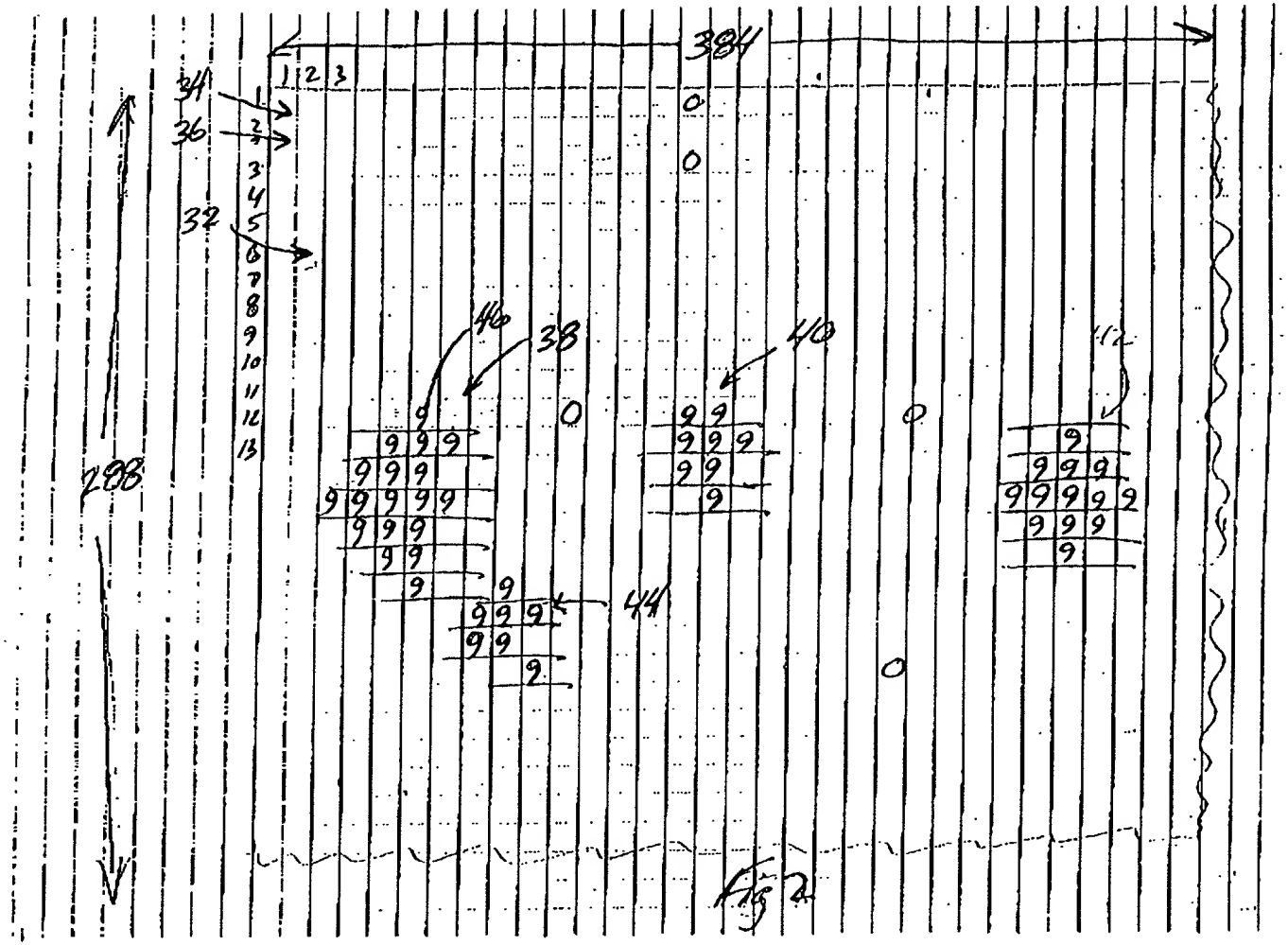

Fig 2

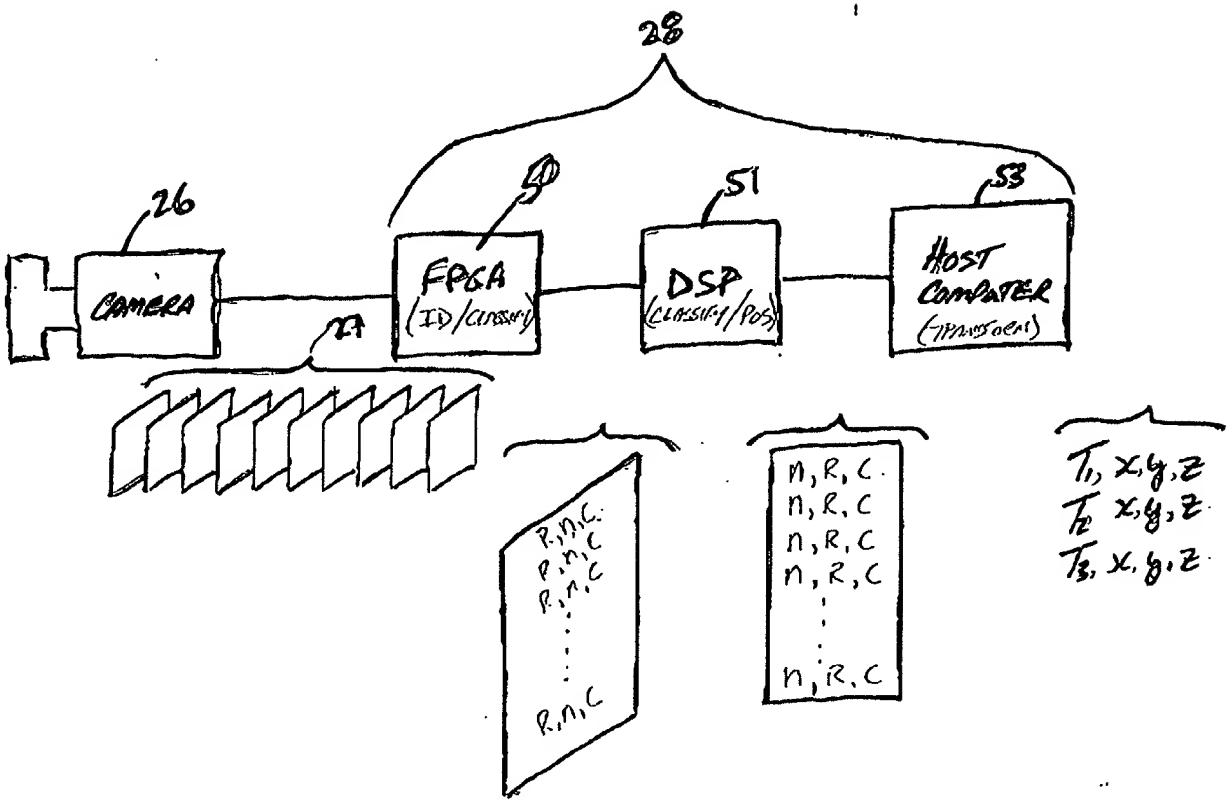

Fig 3

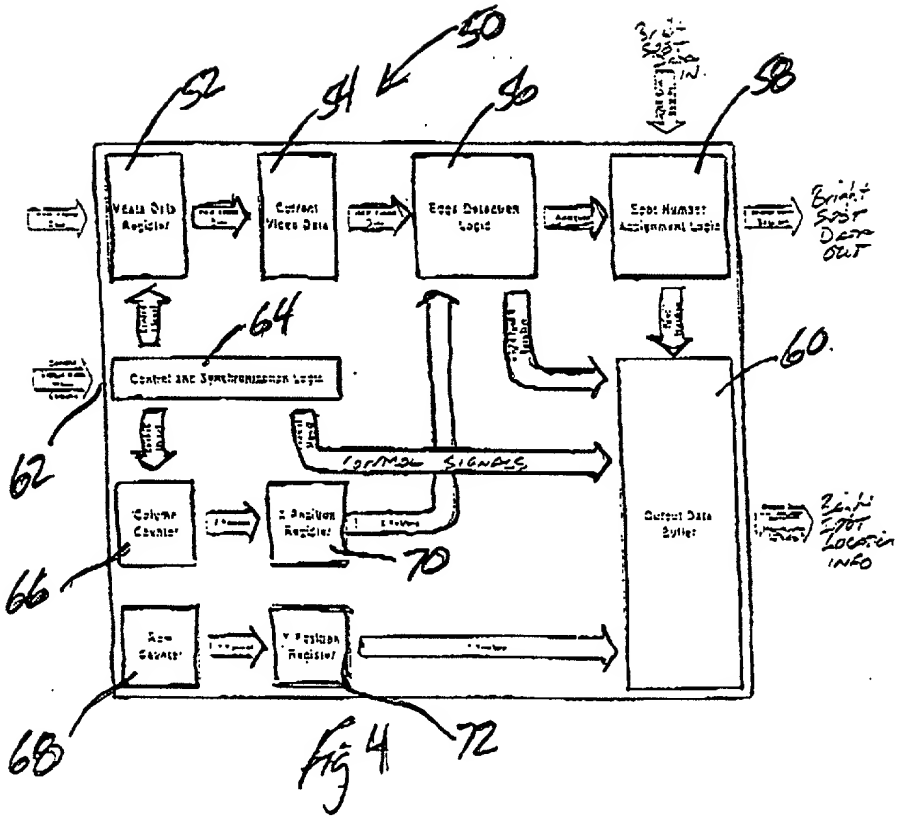
50
52
54
56
58
60
62
64
66
68
70
72
Control and Synchronization Logic
Output Data Buffer

Fig 4

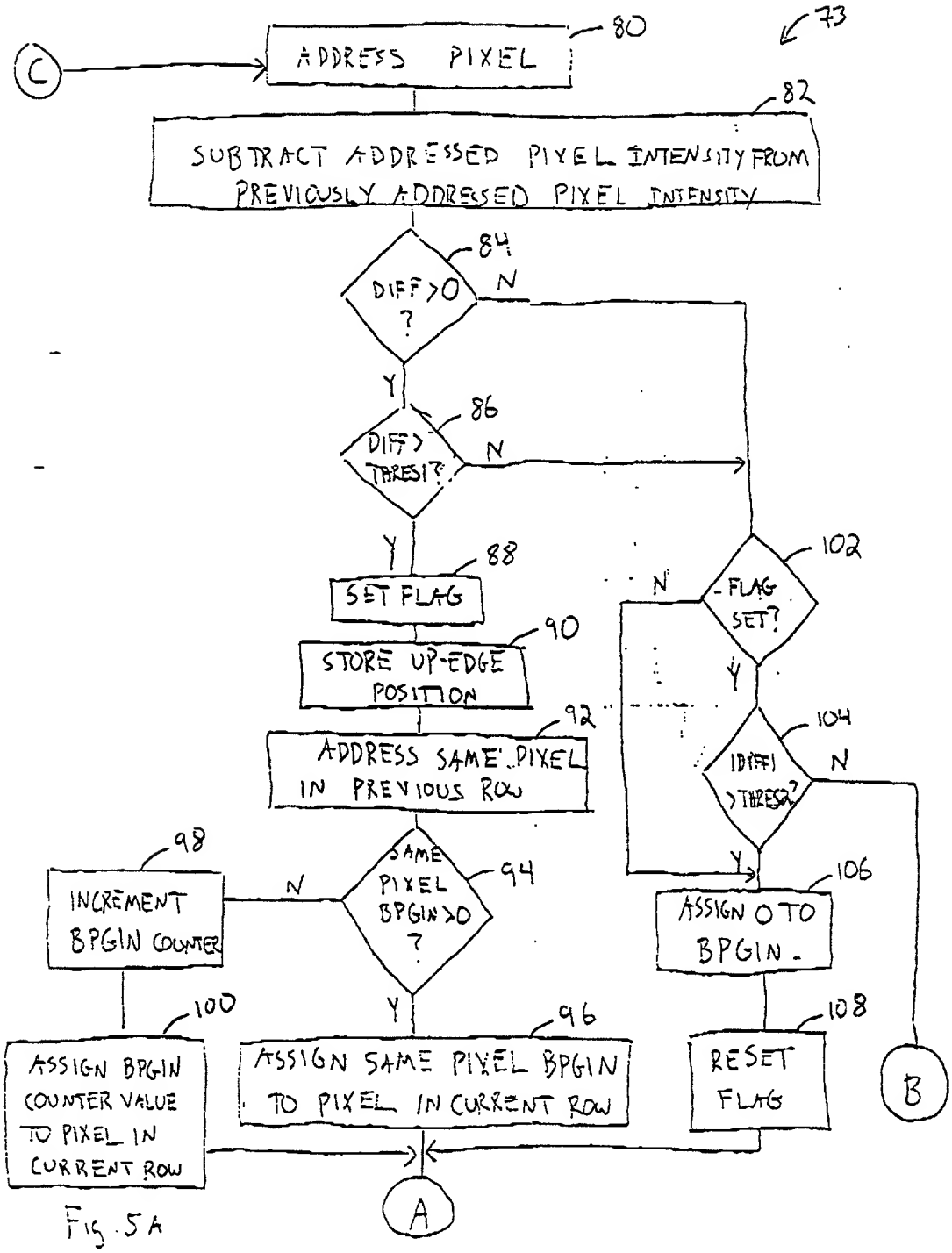
C
ADDRESS PIXEL
80
73
82
SUBTRACT ADDRESSED PIXEL INTENSITY FROM PREVIOUSLY ADDRESSED PIXEL INTENSITY
84
DIFF>0 ?
N
Y
86
DIFF> THRESH?
N
Y
88
SET FLAG
90
STORE UP-EDGE POSITION
92
ADDRESS SAME PIXEL IN PREVIOUS ROW
98
INCREMENT BPGIN COUNTER
N
SAME PIXEL BPGIN>0 ?
94
Y
100
ASSIGN BPGIN COUNTER VALUE TO PIXEL IN CURRENT ROW
96
ASSIGN SAME PIXEL BPGIN TO PIXEL IN CURRENT ROW
A
102
FLAG SET?
N
Y
104
|DIFF| >THRESH?
N
Y
106
ASSIGN 0 TO BPGIN
108
RESET FLAG
B

Fig. 5A

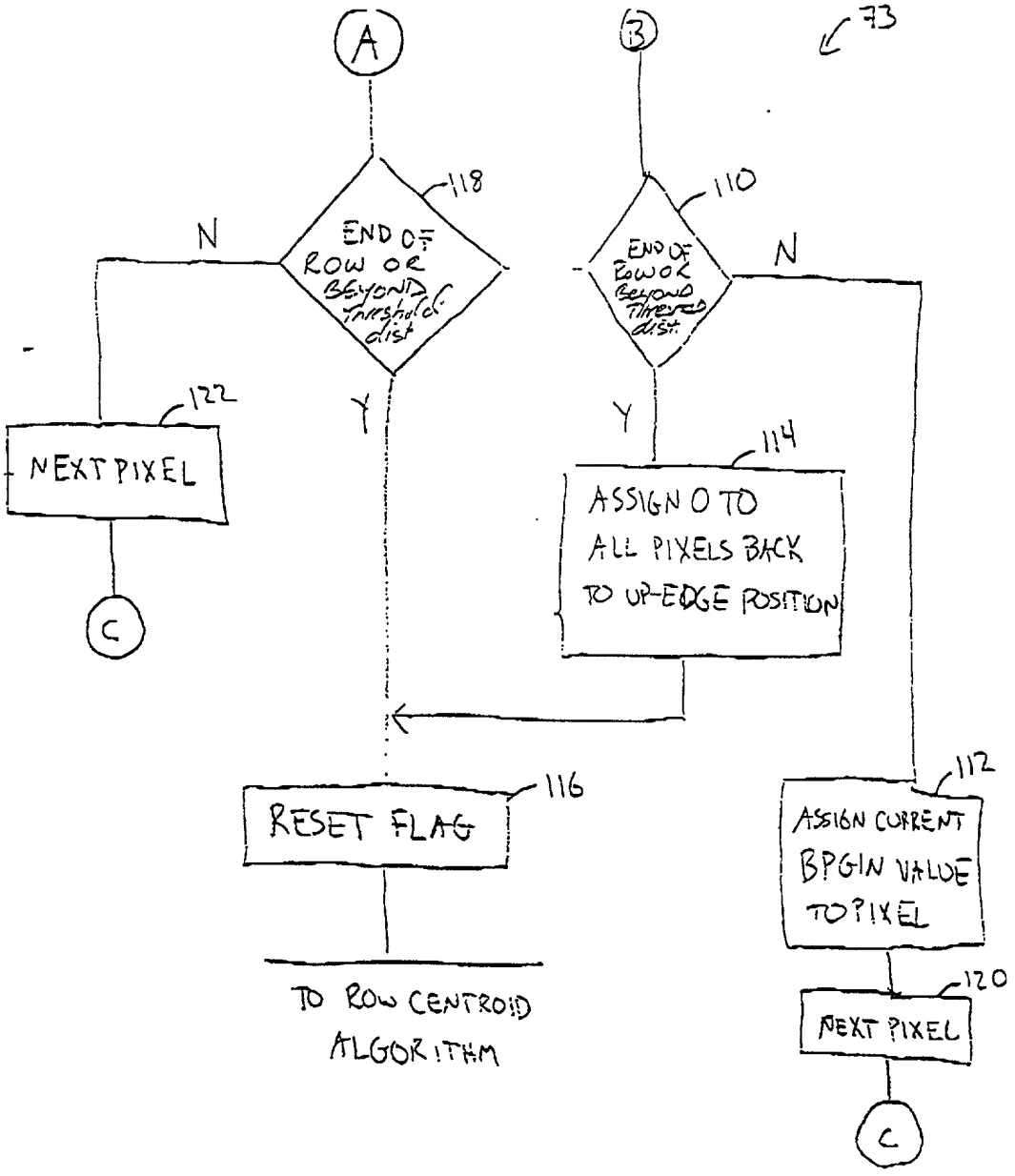
A
B
73
118
END OF ROW OR BEYOND THRESHOLD DIST
N
Y
122
NEXT PIXEL
C
110
END OF ROW OR BEYOND THRESHOLD DIST
N
Y
114
ASSIGN 0 TO ALL PIXELS BACK TO UP-EDGE POSITION
116
RESET FLAG
TO ROW CENTROID ALGORITHM
112
ASSIGN CURRENT BPGIN VALUE TO PIXEL
120
NEXT PIXEL
C

Fig 5B

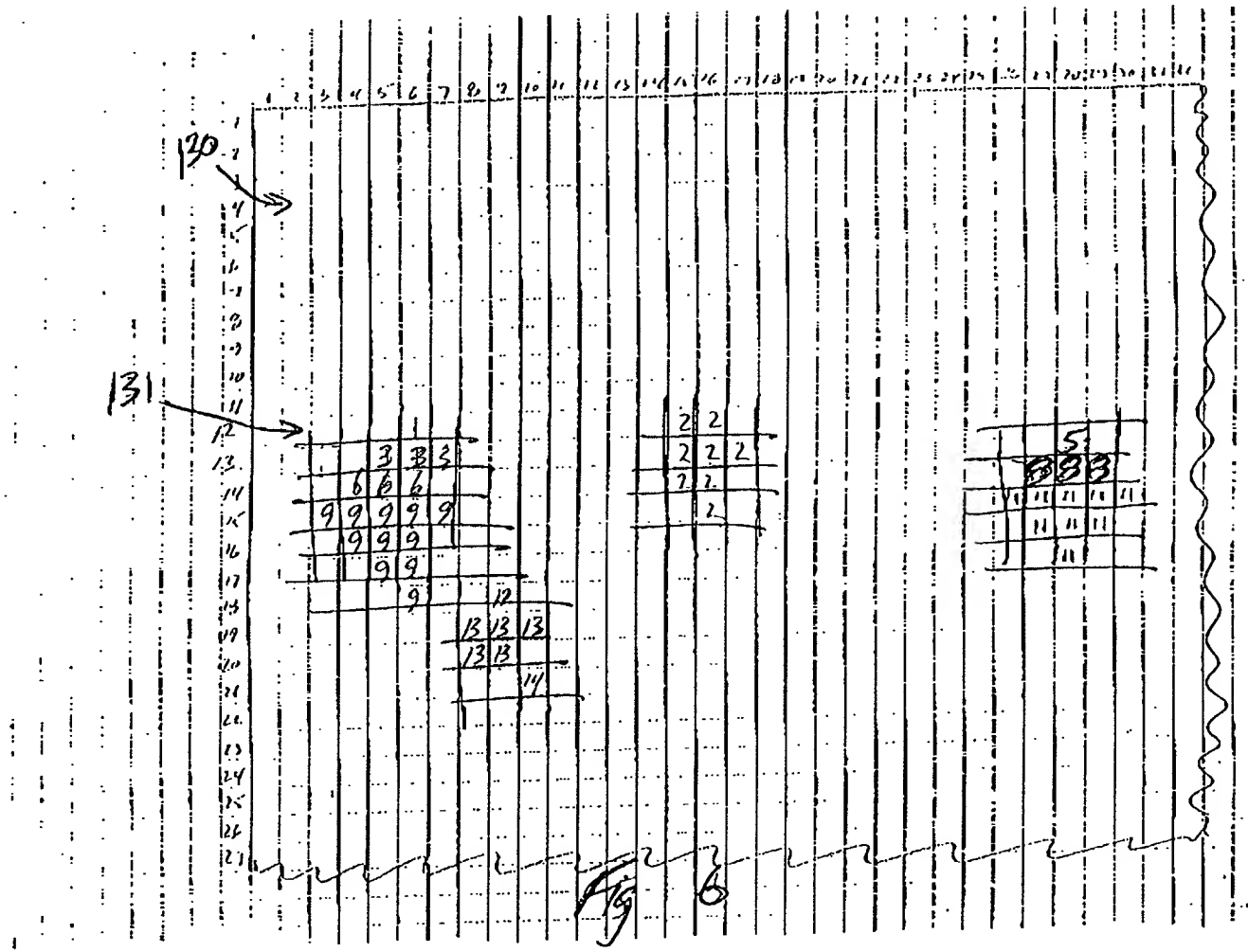

FIG 6

FPGA

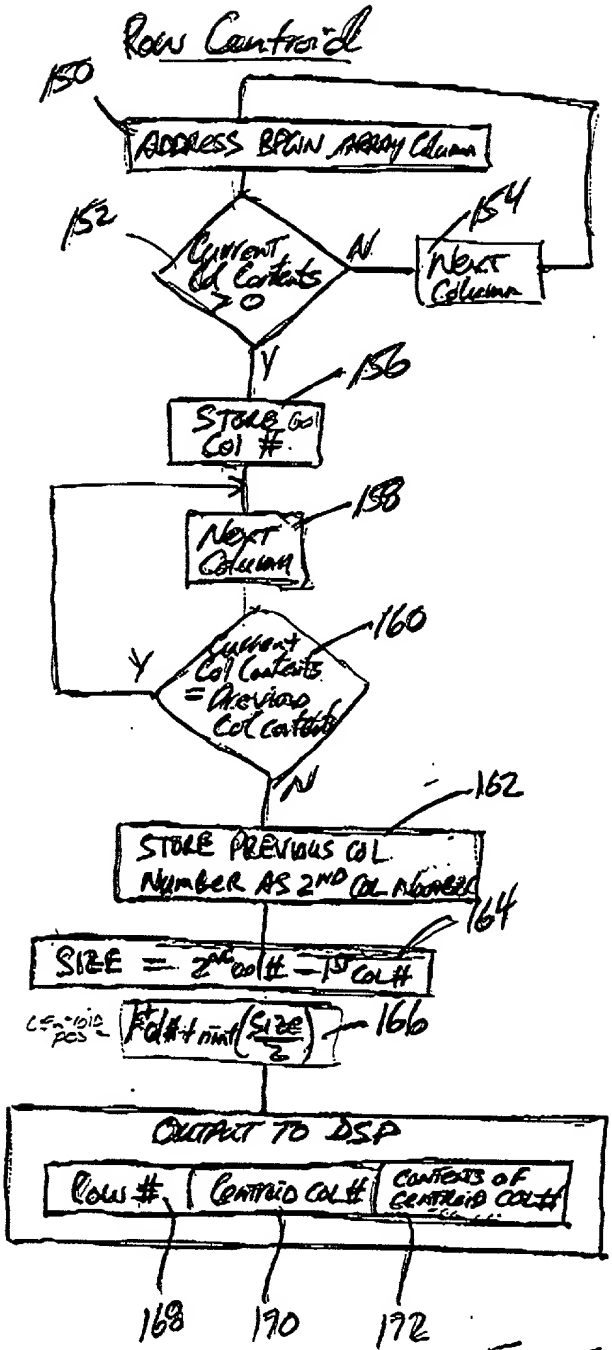
Row Controller
149
150
ADDRESS BEGIN ARRAY Column
152
Current Col Contents = 0
N
154
Next Column
Y
156
STORE Col Col #
158
Next Column
160
Current Col Contents = Previous Col contents
Y
N
162
STORE PREVIOUS COL Number AS 2ND COL NUMBER
164
SIZE = 2nd col# - 1st col#
Centroid pos =
1st col# + min(Size/2)
166
OUTPUT TO DSP
Row #
Centroid Col #
Contents of Centroid Col #
168
170
172

Fig 7

Bright Pixel Row Centroid Array

Output From Fig 7.

133

Row	Col	No
12	6	1
12	15	2
13	6	3
13	16	4
13	28	5
14	5	6
14	15	7
14	28	8
15	5	9
15	16	2
15	28	11
16	5	9
16	28	11
17	5	9
17	28	11
18	6	9
18	9	12
19	9	13
20	8	13
21	10	14

Fig. 8

Bright Pixel Grouping Algorithm

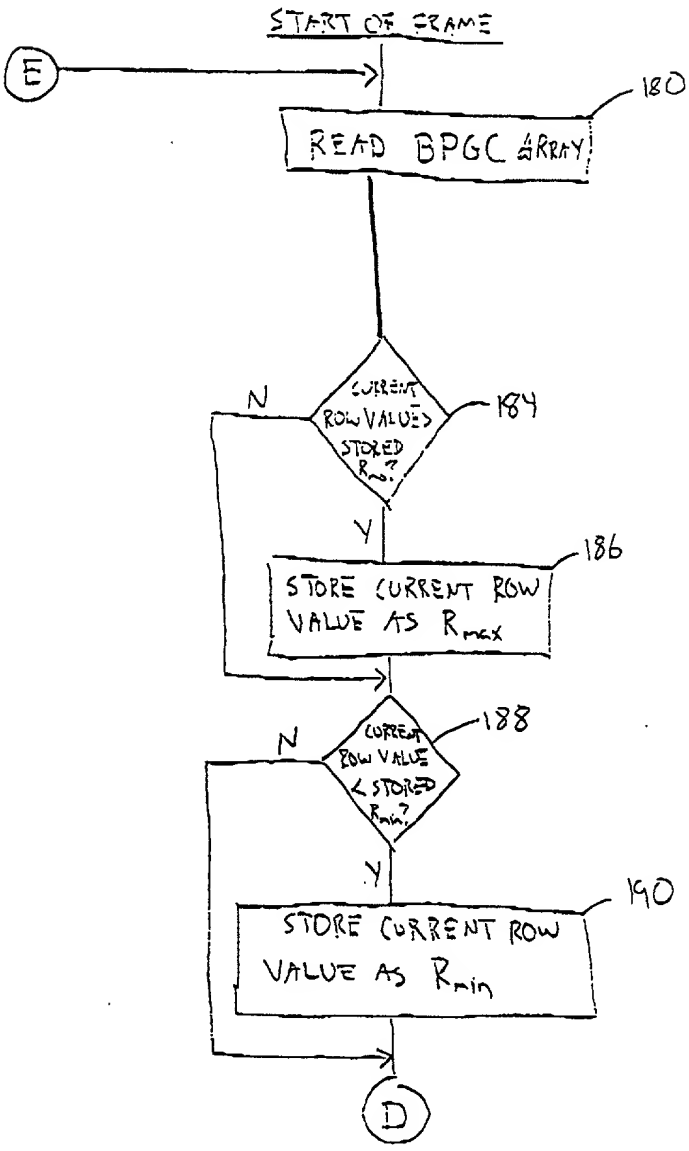

Fig 9A

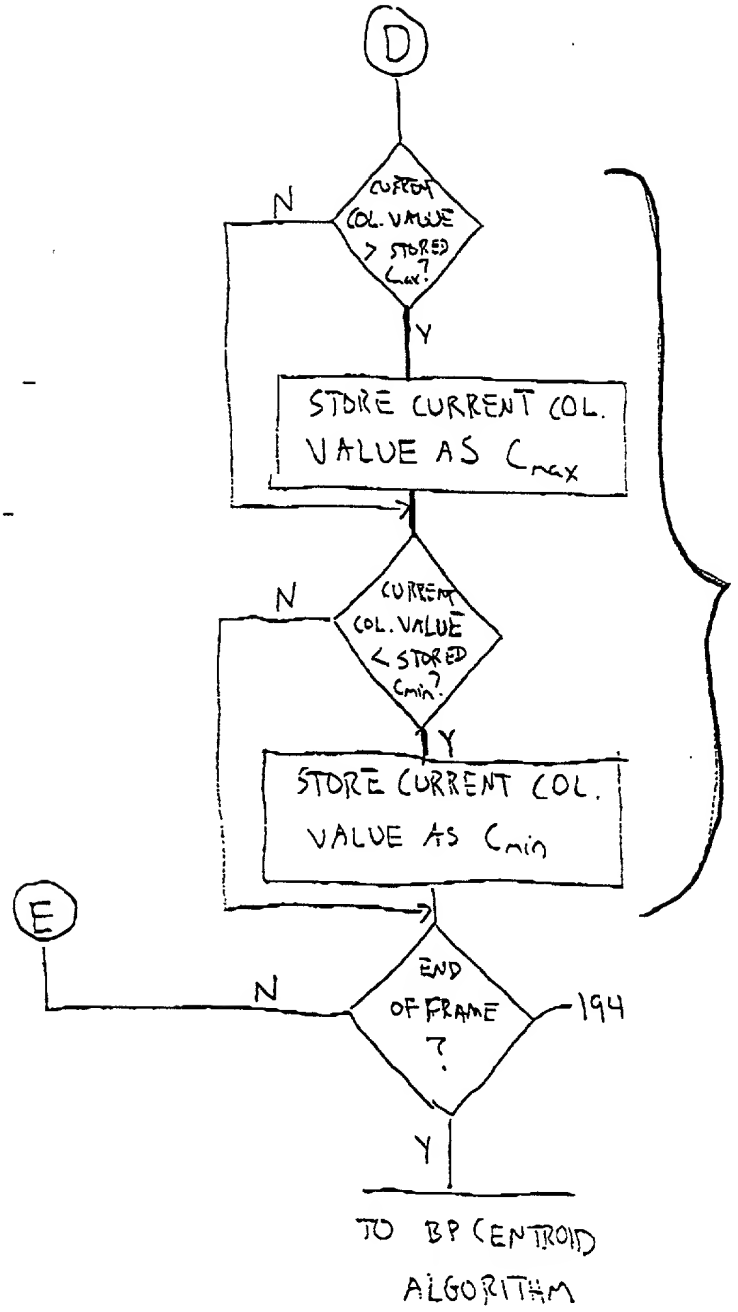
D
CURRENT COL. VALUE > STORED Cmax?
N
Y
STORE CURRENT COL. VALUE AS Cmax
CURRENT COL. VALUE < STORED Cmin?
N
Y
STORE CURRENT COL. VALUE AS Cmin
192
E
END OF FRAME ?
N
194
Y
TO BP CENTROID ALGORITHM
179

Fig. 9B.

BPG Ramp Array

OUTPUT FROM FIG 9

BPGIN	Row min	Row max	Col min	Col max
1	12	12	6	6
2	12	15	15	16
3	13	13	6	6
5	13	13	28	28
6	14	14	5	5
8	14	14	28	28
9	15	18	5	6
11	15	17	28	28
12	18	18	9	9
13	19	20	8	9
14	21	21	10	10

300

Fig. 10

DSV

BPG Centroid Algorithm

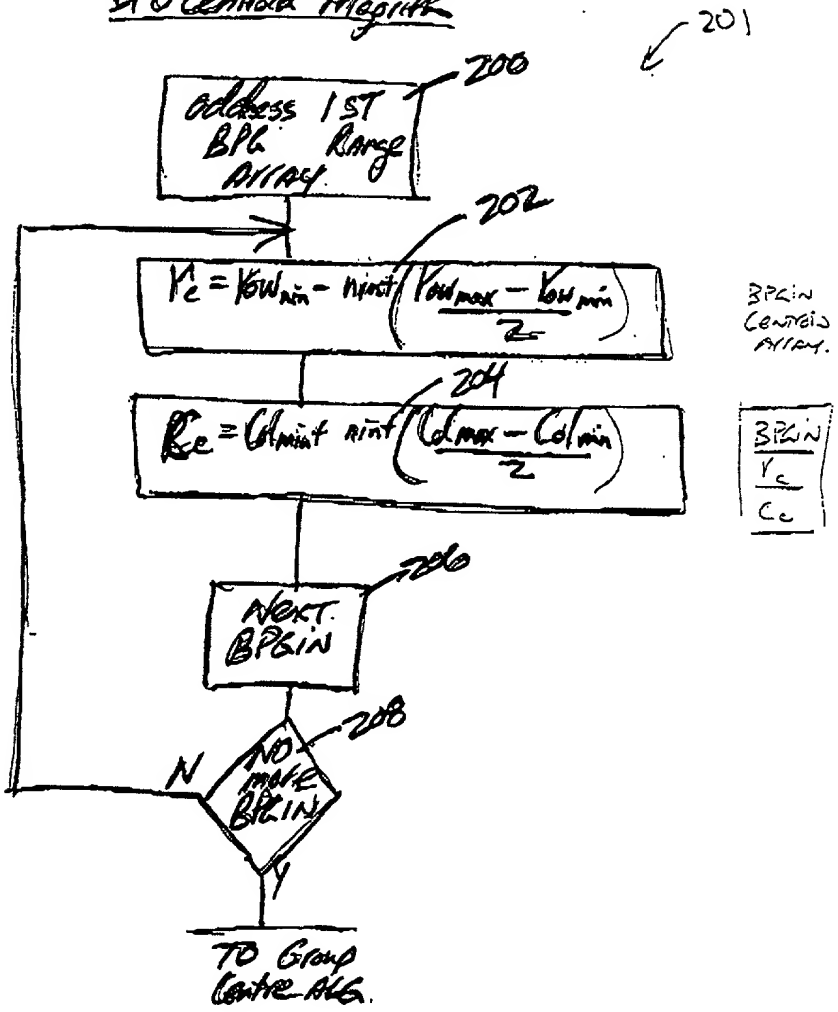

Fig 11

OUTPUT FROM FIG 11

210 ↘

BPG CENTROID ARRAY

1	12, 6	1	← 211
2	13, 15	2	
3	13, 6	1	
5	13, 28	5	
6	14, 5	1	
8	14, 28	5	
9	16, 5	1	
11	16, 28	5	
12	18, 9	1	
13	19, 8	1	
14	21, 10	1	

Fig. 12

DSP

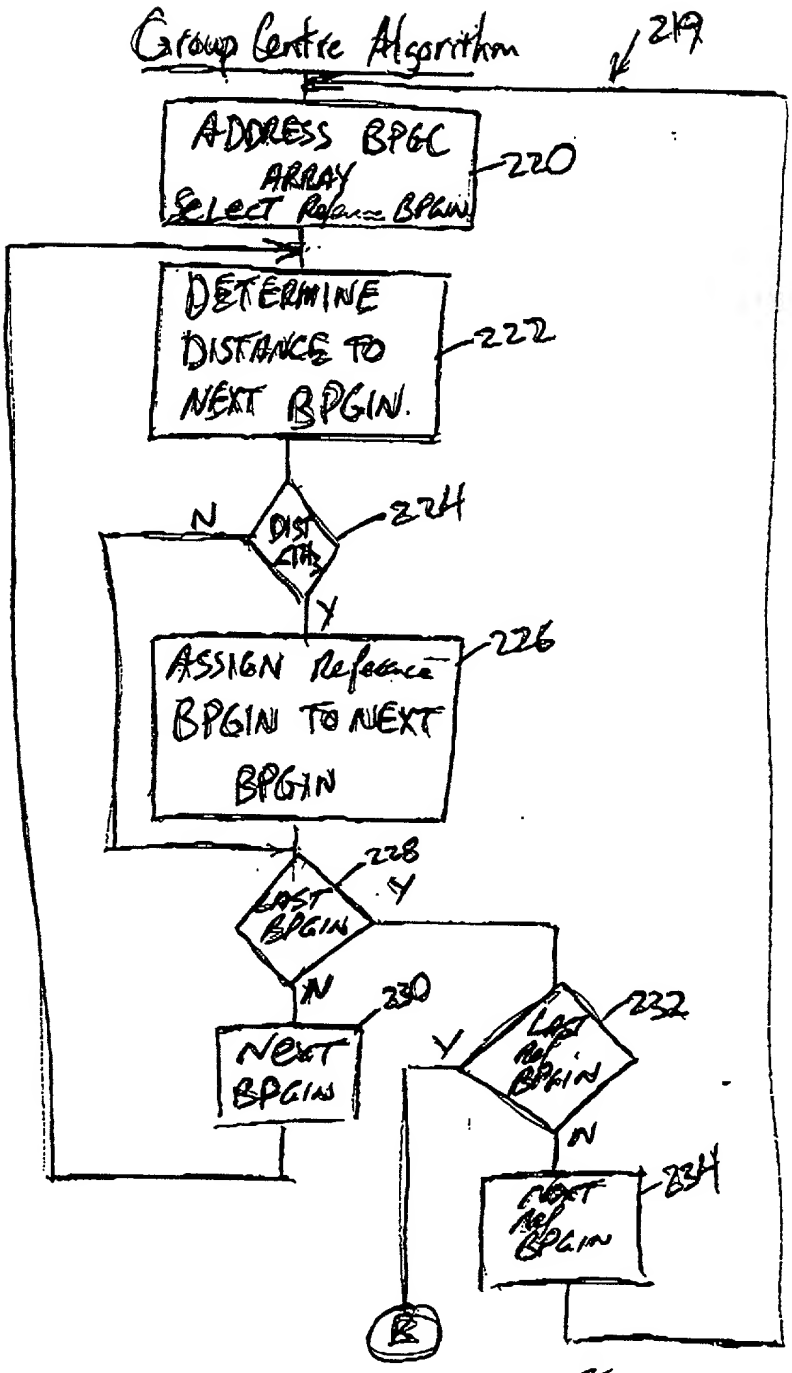
Group Centre Algorithm
219
ADDRESS BPGC ARRAY
220
SELECT Reference BPGIN
DETERMINE DISTANCE TO NEXT BPGIN.
222
DIST < Th
224
N
Y
ASSIGN Reference BPGIN TO NEXT BPGIN
226
LAST BPGIN
228
Y
N
NEXT BPGIN
230
LAST Ref BPGIN
232
Y
N
NEXT Ref BPGIN
234
B

Fig 13A.

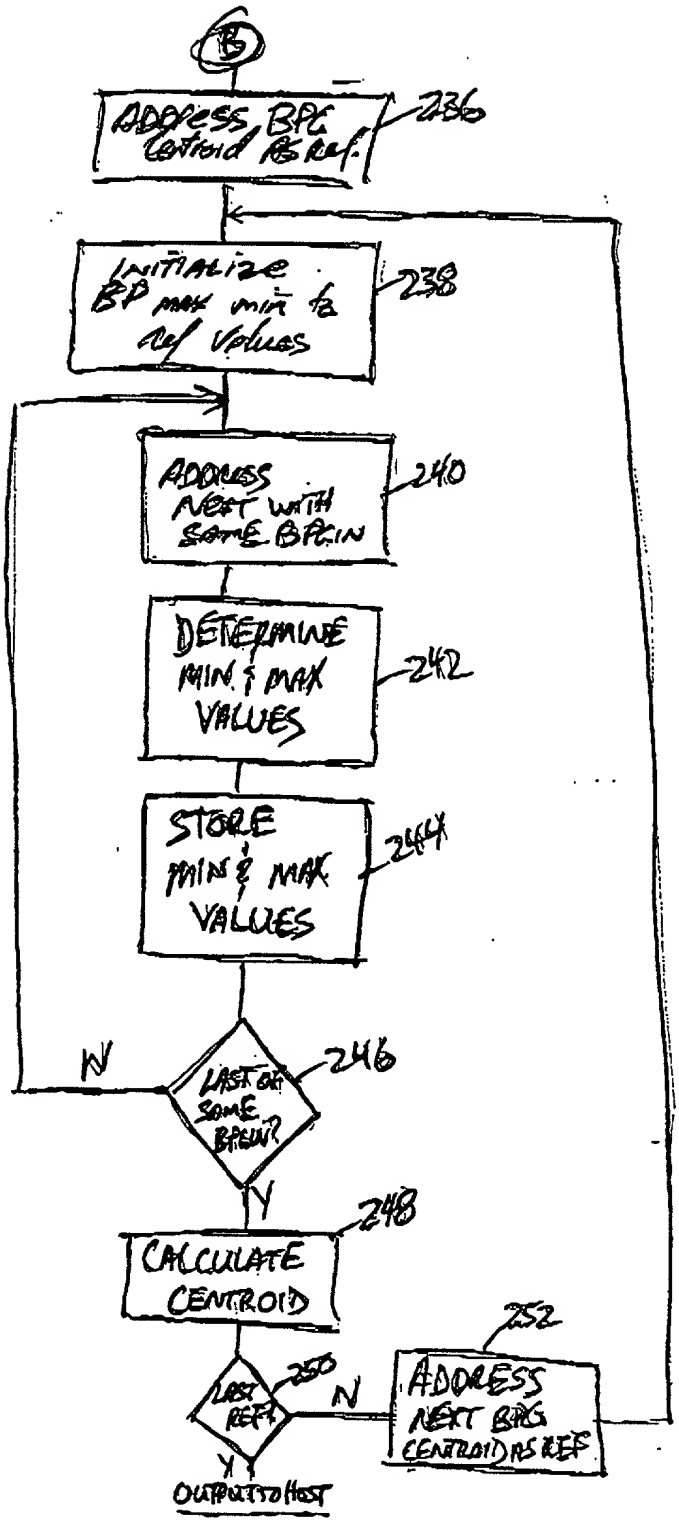
B
ADDRESS BPG CENTROID AS REF.
236
INITIALIZE BP MAX MIN to ref VALUES
238
ADDRESS NEXT WITH SAME BPG.IN
240
DETERMINE MIN & MAX VALUES
242
STORE MIN & MAX VALUES
244
N
LAST OF SAME BPG.IN?
246
Y
CALCULATE CENTROID
248
LAST REF?
250
N
ADDRESS NEXT BPG CENTROID AS REF
252
Y
OUTPUT TO HOST

Fig. 13B

OUTPUT From Fig 10 with $Th_3 = 5$

254 →

		256 Column	258
	Row	↓	↓
1	(12, 21, 6, 10)		16, 8
2	(13, 13, 15, 15)		13, 15
5	(13, 16, 28, 28)		14, 28

Fig 14

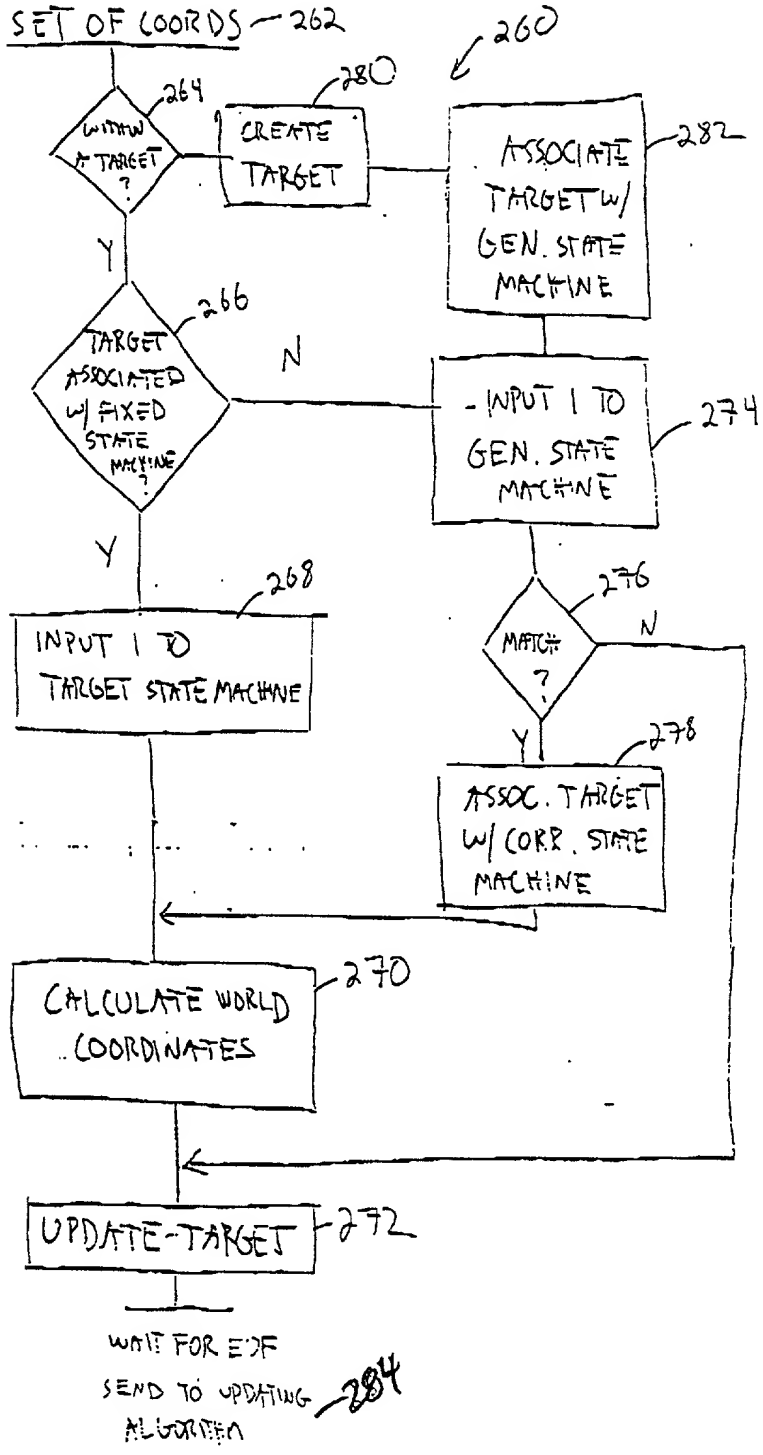
SET OF COORDS
262
260
WITHIN A TARGET ?
264
CREATE TARGET
280
ASSOCIATE TARGET W/ GEN. STATE MACHINE
282
Y
TARGET ASSOCIATED W/ FIXED STATE MACHINE ?
266
N
INPUT 1 TO GEN. STATE MACHINE
274
Y
INPUT 1 TO TARGET STATE MACHINE
268
MATCH ?
276
N
Y
ASSOC. TARGET W/ CORR. STATE MACHINE
278
CALCULATE WORLD COORDINATES
270
UPDATE-TARGET
272
WAIT FOR EOF SEND TO UPDATING ALGORITHM
284

Fig 15

Host-

Updating Algorithm

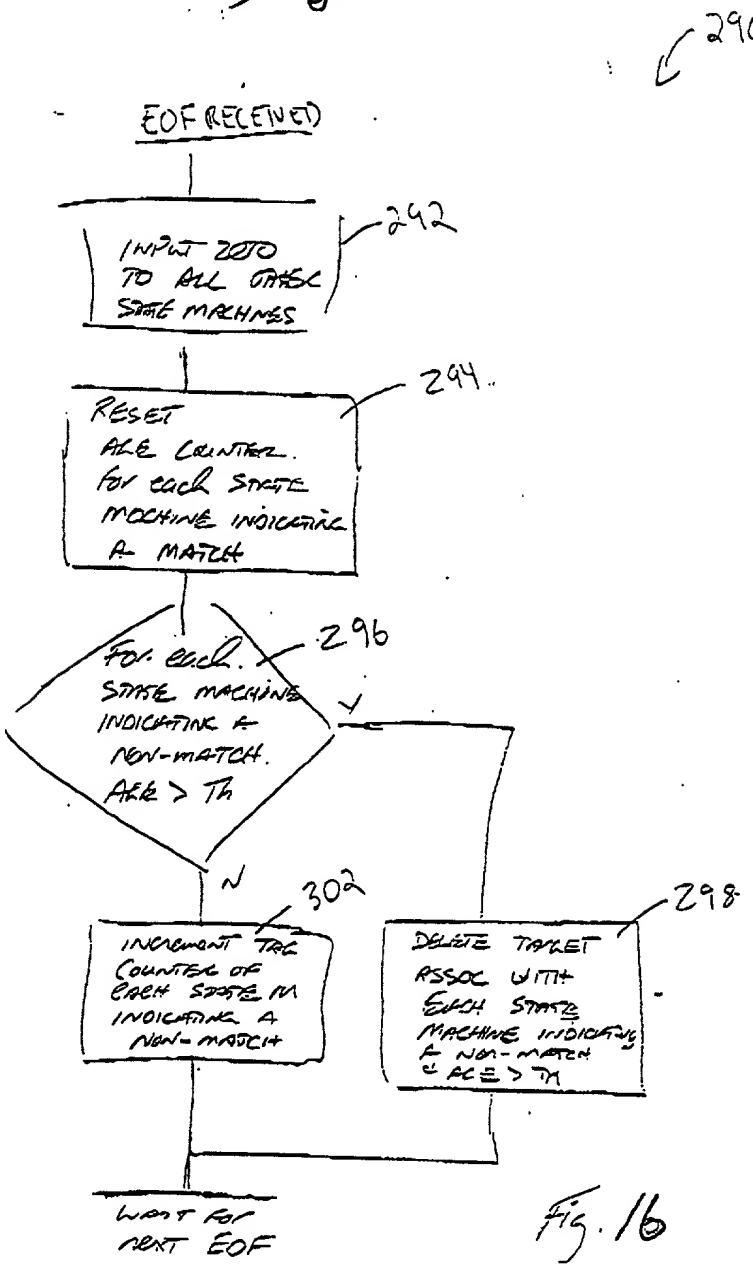

Fig. 16